Attachment B4b,c,d-1 Total Emissions Testing Report for Chrome Scrubber #1 Servicing Chrome Tank #1 and Chrome Tank #3

TOTAL CHROMIUM EMISSIONS TESTING REPORT

Performed for:

CENTURY PLATING COMPANY, INC.
CHICAGO, ILLINOIS

Performed By:

RMC Environmental, Inc.
Project Number: 98-015-311

RMC Environmental, Inc.
PO Box 1008
Elgin, Illinois 60121-1008

800-532-3391 Voice
847-669-5389 Fax

29 September 1998

I, Rachel M. Chleborowicz, certify that the Chromium Emissions Testing conducted on the decorative plating scrubber installed at the Century Plating Company, Inc. facility in Chicago, Illinois, was conducted under my supervision. All of the results obtained during this testing are authentic and accurate.

Rachel Chleborowicz
Project Manager

Prepared by:

CENTURY PLATING, INC.
CHICAGO, ILLINOIS

Submitted By:

RMC Environmental, Inc.
11311-B Douglas Street
Huntley, Illinois 60142

RMCEI Reference Number: 98-015-311

September 1, 1998

TOTAL CHROMIUM EMISSIONS TEST REPORT For Century Plating, Inc. Chicago, Illinois

Table of Contents

1.0 PROJECT SUMMARY

1.1 Source Information

Plant Name and Address:	Century Plating Company, Inc. 2939 North Oakley Avenue Chicago,Illinois 60618
Units Tested:	Primary Decorative chrome tank scrubber.

1.2 Testing Firm Information

Firm Name and Address:	RMC Environmental, Inc. 11311-B Douglas Street Huntley, Illinois 60142
Firm Contact:	Rachel M. Chleborowicz - Project Manager
Telephone Number:	800-532-3391 Voice 847-669-5389 Fax

1.3 Test Information

Test Requested By:	Century Plating Comapny, Inc.
Firm Contact:	Mr. Victor LaPorta
Telephone Number:	773-477-1620 Phone 773-477-1823 Fax
Test Objective:	Conduct total chrome, moisture and flow rate testing on plating tanks in accordance with the MACT regulations and EPA Method 306 (40 CFR 63, Appendix A).
Test Methods:	EPA Methods 1, 2, 3, 4 and 306
Test Date:	September 1, 1998
Test Coordinators:	Mr. Victor LaPorta
Test Personnel:	Rachel Chleborowicz - Project Manager Chris McDermand - Environmental Technichian

2.0 SUMMARY OF RESULTS

The results of the emissions testing performed on the large chrome tank stack are presented in **Table 2-1.** Detailed results of all of the testing completed on this location are located in **Appendix A.** The field data and the analytical results are presented in **Appendix B** and **C**, respectively. Calibration sheets and equipment performance checks are presented in **Appendix D**, along with the chain of custody and QA/QC supporting documentation from the analytical laboratory.

A cyclonic flow check was performed at the sampling location to determine the existence of abnormal flow. The observed average yaw angle for the secondary unit location was 9.5°. Section 2.5 of EPA Method 1 indicates that a sampling location with an average yaw angle of $\leq 20°$ is acceptable. As indicated by the average of the three test runs, the concentrations of the chromium emissions were below the MACT regulation standards of and 0.030 mg/DSCM for composite mesh pad scrubber systems on decorative chrome plating tanks.

TABLE 2-1

SUMMARY OF TOTAL CHROMIUM RESULTS

Century Plating Company, Inc.
September 1, 1998

Location	Test Parameter	Result	Specification
Secondary Plating Tank Stack	mg/DSCM Flow rate DSCFM	0.005 8,045	$\leq$ 0.030 mg/DSCM for existing large sources

3.0 TEST PROCEDURES AND EMISSIONS DETERMINATIONS

The sampling and analytical requirements for this program include the determination of total chrome, O_2/CO_2, moisture and volumetric flowrates from the stack effluent. The plating process was operated at 100% capacity. **Figure 3-1** illustrates the sampling system used for the total chrome testing. The specific equipment and procedures that were used are detailed below.

3.1 Test Procedures

Total chrome compliance testing was completed on the exhaust stacks from the chrome plating tanks. The compliance testing consisted of three two-hour test runs utilizing EPA Methods 1, 2, 3B (40 CFR 60, Appendix A) and 306 (40 CFR 63, Appendix A).

The number and location of the sampling points were determined according to the procedures outlined in EPA Method 1. The exhaust stack cross section was divided into 24 equal areas with 12 sampling points on each to two axes. A cyclonic flow check was performed at the sampling location to determine the flow angles at each point. An S-type pitot, oil manometer, and an angle finder were used for these determinations. At each point, the Pitot was positioned at a right angle to the flow, the pitot was then rotated until a null reading was obtained. The angles of rotation were then noted.

The flue gas velocity and volumetric flow rates were determined according to EPA Method 2. Velocity head measurements (delta P) were made using an S-type Pitot tube conforming to the geometric specifications indicated in Method 2 and each Pitot has been assigned a coefficient of 0.84. The differential pressures were measured using an oil manometer of the appropriate range. Flue gas temperatures were obtained with chromel-alumel thermocouples equipped with a digital readout.

The composition of the flue gas was determined utilizing the procedures outlined in Method 3B. The percent moisture content of the flue gas was obtained from the amount of moisture collected in the Method 306 sampling train. Analysis for carbon dioxide and oxygen were was performed using a Fyrite analyzer and the analytical results were used in the calculation of flue gas composition and molecular weight.

3.2 Emissions Determinations

The total chrome samples were drawn isokinetically from the source using an EPA method 306 sampling train. The sampling train consisted of a glass nozzle and probe liner, an attached Type S Pitot tube, four glass impinger chilled and a metering console. No filter is used for this method.

The first impinger is left empty, the second and third impingers contain 100 ml of 0.1 N sodium hydroxide (NaOH) in place of water, and the fourth impinger contains 200g of preweighed silica gel for moisture removal. Each of the twenty-four points were sampled for 5 minutes resulting in a net run time of 120 minutes.

After sampling, the reagents were returned to their original container, weighed, the weights recorded on the label and the liquid level marked. The silica gel was returned to the original container, weighed and the weight recorded on the label. The volume of water vapor condensed in the impingers and the volume of water collected in the silica gel

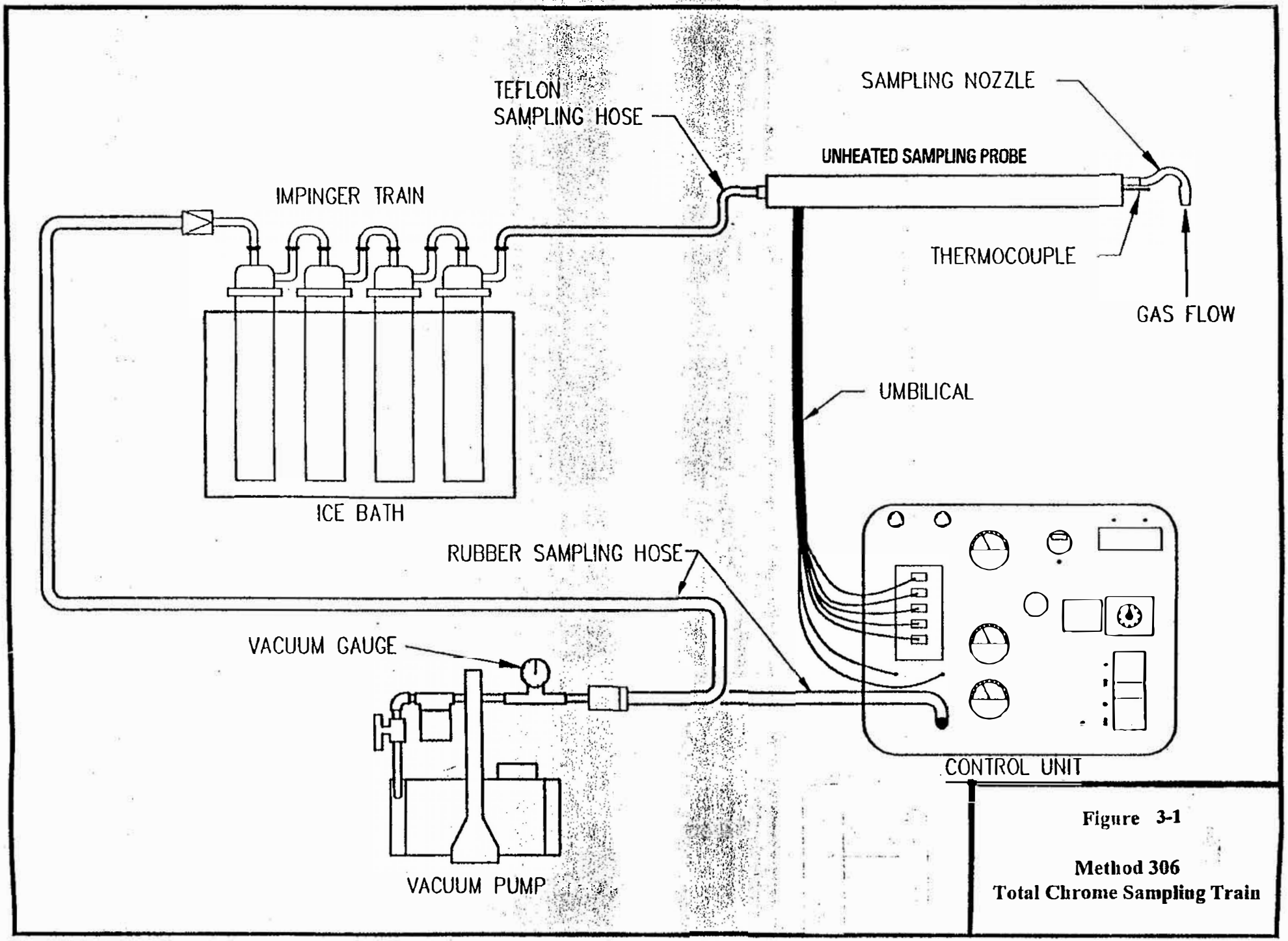


Figure 3-1

Method 306
Total Chrome Sampling Train

were summed and entered into the moisture content calculations. All sampling components exposed to the effluent were rinsed three time with NaOH and the rinses were added to the reagent containers.

The combined samples and rinses were analyzed for total chrome using ion chromatography (IC) coupled with a post-column reactor (PCR).

Appendix A - Reference Measurement Data With Emission Rate Calculations

RMC Environmental, Inc.
Emissions Testing & Consulting

Plant: Century Plating
Project #: 98-015-311
Location: Unit 1 - Mesh Pad System
Date: 09/16/98

Sample Identification			1-M306-1	1-M306-2	1-M306-3
Test Date			09/01/98	09/01/98	09/01/98
Start			810	1030	1240
Finish			1015	1235	1445
Total			120	120	120
Cp	Pitot Coefficient	(CF)	0.84	0.84	0.84
A	Area of stack	sq. inches	530.93	530.93	530.93
Pbar	Barometric Pressure	(in HG)	30.12	30.12	30.18
Wm	Volume of Condensate	(mg)	47.6	47.1	50.4
Ts	Temperature of Effluent	(F)	93.1	93.3	93.9
Pavg	Average Delta P		0.460	0.455	0.450
Pg	Static Pressure	(in H2O)	-0.25	-0.28	-0.24
DH	Delta H, Orifice pressure differential	(in H2O)	1.82	1.83	1.81
Tm	Meterbox Temperature	(F)	80.6	89.5	91.1
Vm	Volume of sample metered	(CF)	90.14	90.693	90.966
Y	Meter correction factor		0.9999	0.9999	0.9999
Dn	Nozzle Diameter	(in)	0.25	0.25	0.25
CO2	Percent Carbon Dioxide	(%)	0.10	0.10	0.10
O2	Percent Oxygen	(%)	20.90	20.80	20.90
CO	Percent Carbon Monoxide	(%)	0	0	0
N2	Percent Nitrogen	(%)	79.00	79.10	79.00
Ms	Molecular Weight (wet)	(lb/lb-m)	28.59	28.58	28.57
Laboratory Results					
	Total Chrome	(mg)	5.80E-03	5.10E-03	2.90E-02
Ps	Absolute pressure of Flue Gas	(in HG)	30.10	30.10	30.16
Vwstd	Volume of Water Vapor	(SCF)	2.24	2.22	2.38
Vmstd	Volume of Metered Gas	(DSCF)	88.978	88.075	88.255
M	Moisture	(%)	2.46	2.46	2.62
Vs	Velocity	(FPS)	39.06	38.85	38.61
Qaw	Volumetirc Flow	(ACFM)	8,641	8,594	8,541
Qsd	Volumetric Flow	(DSCF)	8,095	8,047	7,993
	Chromium Concentration	(mg/DSCM)	0.002	0.002	0.012
	Chromium Concentration	(lb/Hr)	6.98E-05	6.16E-05	3.47E-04
I	Isokenetic	(%)	99.07	98.65	99.52

Appendix B - Field Data Sheets For Total Chrome

Sampling and Velocity Traverse Point Determination
EPA Method 1

PLANT NAME: CENTURY PLATING

CITY, STATE: Chicago IL

SAMPLING LOCATION: DEC. PLATING TANK Scrubber

NO. OF PORTS AVAILABLE: 2

NO. OF PORTS USED: 2

PORT INSIDE DIAMETER: 3"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT: 36.75

NIPPLE LENGTH AND/OR WALL THICKNESS: 0.75

DEPTH OF STACK OR DUCT: 36

STACK OR DUCT WIDTH (IF RECTANGULAR): –

EQUIVALENT DIAMETER:

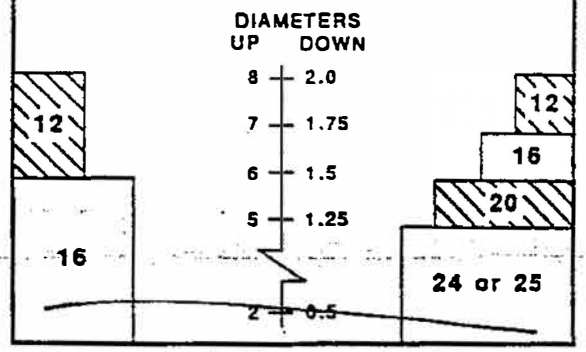
$D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2(\quad)(\quad)}{(\quad + \quad)} =$

DISTANCE FROM PORTS TO FLOW DISTURBANCES	UPSTREAM	DOWNSTREAM
DIAMETERS		

STACK/DUCT AREA = 1017.9 IN²

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		96.6	80.6	65.8	35.5	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.8	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.8	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.2	61.8	38.8	31.6	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.8	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	2.1	0.76	1.5
2	6.7	2.4	3.2
3	11.8	4.2	5.0
4	17.7	6.4	7.2
5	25.0	9.0	9.8
6	35.6	12.8	13.6
7	64.4	23.2	24.0
8	75.0	27.0	27.8
9	82.3	29.6	30.4
10	88.2	31.8	32.6
11	93.3	33.6	34.4
12	97.9	35.2	36.0
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

F-0018
10-90

SEE REVERSE FOR FIELD USE CHECKLIST

CYCLONIC FLOW DETERMINATIONS

Plant Name: Century Plating Job No. 98-015-311

City/State: Chicago, IL Date: 1 Sept 98

Test Loc.: Scrubber Personnel: Rve

Barometric Pres. (Pbar) 30.12 In. Hg Static Pres. (Pg) -0.30 In. H_2O

Pitot/Orifice ID M-2-1 Pitot Coef. (Cp) 0.84 Pres. Gauge Set ID ______

Thermocouple ID — Duct Length/Diameter 36 Width –
---Specify inches (") or feet (')---

Horizontal Duct Flyash/Dust Buildup > 1" Depth (√)? Yes ___ No X (If Yes, see Page 2 for Instructions.)

PRELIMINARY TRAVERSES
Start - Finish Times: 900A - 930A

Test Pt.	Yaw Ang. °	ΔP "H_2O	Temp. °F
A-1	0	0	92
2	10	0	92
3	4	0	93
4	4	0	93
5	5	0	93
6	5	0	93
7	0	0	93
8	0	0	93
9	6	0	93
10	6	0	93
11	5	0	93
12	5	0	93
B-1	5	0	94
2	2	0	94
3	2	0	94
4	-4	0	93
5	-4	0	93
6	-3	0	93
7	-2	0	94
8	+2	0	94
9	+2	0	94
10	+2	0	94
11	+0	0	94
12	+0	0	93
Avg.	3.2	0	93.3

ALIGNMENT APPROACH DATA
(OMIT IF AVERGE OF YAW ANGLES ≤ 20°)

Run No.*		Run No.*		Run No.*	
Base Time	Min./Point**	Base Time	Min./Point**	Base Time	Min./Point**
Avg. ΔP_v***		Avg. ΔP_v***		Avg. ΔP_v***	

Note: Yaw angle average is sum of the absolute values divided by number of measurements, and must be ≤ 20°.

ΔP average is square of average square root.

* From isokinetic sampling field data sheet.

** Minutes/Point = cos φ (Base Time).

*** Average $\Delta P_v = [(\Sigma \cos \phi \sqrt{\Delta p}) / n]^2$

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See page 2 for cyclonic flow check criteria.

SAMPLING DATA - METHOD(S) 306

662-1

CLIENT

PLANT Century Plating

RUN NO. 1-306-01

CITY/STATE Chicago IL

JOB NO. 98-015-311 DATE 1 Sept 98

SAMPLING LOC. Unit 6

TIME START 810

BAROMETRIC PRESSURE, IN. HG 30.12 STATIC PRESSURE, I. H_2O -0.25

TIME FINISH 1015

LEAK √, VACUUM IN. HG 10 5

TEST PERSONNEL RMC/CWD

LEAK RATE, CFM 0.000 0.000

POSTTEST POS PRESS LEAK √ OK? •

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS

- √ PITOT, PRETEST
- ___ PITOT, POSTTEST
- √ NOZZLE, PRE/POST
- √ TC 70 °F PRE
- √ TC 70 °F POST
- √ ORSAT SYSTEM

FILTER/XAD	TARE WT.
NaOH	200.2
	219
	29
Silgel	200g
	218.6

EQUIPMENT I.D. NUMBERS

REAGENT BOX ___ METER BOX 71-22 Y 0.9999

PITOT M-2-1 C_p 0.84 NOZ'L N-250 DIA. 0.250

TC READOUT ___ TC PROBE ___ UMBILICAL ___

SAMPL'G BOX ___ ORSAT PUMP ___ TEDLAR BAG ___

NOMOGRAPH DATA

DELTA-H@	1.7970
METER TEMP.	80
EST. XH_2O	2
"C" FACTOR	1.022
STACK TEMP.	93
REF DELTA-P	0.463
"K" FACTOR	3.974

LEAK CHECKS

B		B	
E		E	
B		B	
E		E	
B		B	
E		E	

38.91 Pt/sec.

Pyrites, %: O_2 20.1, CO_2 0.9

Yqa 0.995

<+5% OF CAL'D Y? (Y) √ (N) ___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H_2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H_2O ACTUAL	ORIFICE SETTING, IN. H_2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES °F FILTER •	GAS TEMPERATURES °F IMPING. EXIT	GAS TEMPERATURES °F PROBE OR COND EXIT**	√
1	A-1	0	624.632	0.46	72	91	1.9	1.8	4		54		√
2	2	5	628.36	0.49	73	93	1.91	1.91	4		54		
3	3	10	632.19	0.48	74	93	1.88	1.88	4		55		
4	4	15	635.92	0.47	74	94	1.84	1.84	4		54		
5	5	20	639.75	0.47	75	94	1.84	1.84	4		56		
6	6	25	643.49	0.45	76	93	1.77	1.77	4		56		
7	7	30	647.28	0.48	77	93	1.89	1.89	4		56		
8	8	35	651.09	0.48	78	93	1.89	1.89	4		56		
9	9	40	654.84	0.45	79	93	1.78	1.78	4		56		
10	10	45	658.52	0.43	80	93	1.7	1.7	4		58		
11	11	50	662.15	0.47	81	93	1.86	1.86	4		58		
12	12	55	665.95	0.46	82	93	1.83	1.83	4		58		
13	B-1	60	669.666	0.43	82	93	1.71	1.71	4		57		
14	2	65	673.25	0.45	82	93	1.79	1.79	4		57		
15	3	70	676.97	0.45	83	93	1.79	1.79	4		57		
16	4	75	680.71	0.44	83	93	1.75	1.75	4		58		
17	5	80	684.39	0.43	84	93	1.72	1.72	4		58		
18	6	85	688.02	0.46	84	93	1.84	1.84	4		58		
19	7	90	691.75	0.46	85	93	1.84	1.84	4		58		
20	8	95	695.51	0.47	85	93	1.88	1.88	4		58		
21	9	100	699.36	0.46	86	93	1.84	1.84	4		59		
22	10	105	703.15	0.48	86	93	1.92	1.92	4		59		
23	11	110	707.01	0.48	87	93	1.92	1.92	4		60		
24	12	115	710.94	0.47	87	94	1.88	1.88	4		60		
25	END	120	714.772										
	FINAL												

• FILTER EXIT for NJ Method 1. FILTER BOX for all others.

•• PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND. EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
120	90.140	0.4603	80.6	93.1	1.8246

100.7% I

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SAMPLING DATA - METHOD(S) 306

CLIENT

PLANT Century Plating — RUN NO. L-306-02

CITY/STATE Chicago, IL — JOB NO. 98-015-311 — DATE 1 Sept 98

SAMPLING LOC. Unit 1 - Decorative Plating — TIME START 1030

BAROMETRIC PRESSURE, IN. HG ~~30.10~~ 30.12 — STATIC PRESSURE, IN. H2O -0.28 — TIME FINISH 1235

LEAK √, VACUUM IN. HG 10 5 — TEST PERSONNEL Rnc/CMC

LEAK RATE, CFM 0.001 — POSTTEST POS PRESS LEAK √ OK? •

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS

- √ PITOT, PRETEST
- √ PITOT, POSTTEST
- √ NOZZLE, PRE/POST
- √ TC 78 °F PRE
- √ TC 78 °F POST
- OK ORSAT SYSTEM

FILTER/XAD	TARE WT.
NaOH	200.6
	232
Silica Gel	200g
	215.1

EQUIPMENT I.D. NUMBERS

REAGENT BOX N/A — METER BOX 71-22 — Y 0.9999

PITOT M-2-1 — C_p 0.84 — NOZ'L N-25 — DIA. 0.250

TC READOUT — TC PROBE — UMBILICAL

SAMPL'G BOX — ORSAT PUMP — TEDLAR BAG

NOMOGRAPH DATA

DELTA-H@	1.797	
METER TEMP.	90	
EST. X_{H2O}	2	
"C" FACTOR	~~1.022~~ 1.041	
STACK TEMP.	93	93
REF. DELTA-P	0.463	0.455
"K" FACTOR	3.974	4.049

LEAK CHECKS

B		B	
E		E	
B		B	
E		E	
B		B	
E		E	

38.69 CFM/sec

Fyrites, %	
O_2	20.8
CO_2	0.9

Tga 0.999

<=>5% OF CAL'D. Y? (Y) √ (N)

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H2O ACTUAL	ORIFICE SETTING, IN. H2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	GAS TEMPERATURES, °F IMPING. EXIT	GAS TEMPERATURES, °F PROBE OR COND EXIT**	√
1	A-1	0	719.935	0.45	87	93	1.81	1.81	4	N/A	60	N/A	√
2	A-2	5	723.64	0.44	88	93	1.77	1.77	4		57		
3	3	10	727.37	0.43	88	93	1.73	1.73	4		57		
4	4	15	726.01	0.46	88	93	1.85	1.85	4		53		
5	5	20	729.79	0.47	89	93	1.89	1.89	4		57		
6	6	25	733.62	0.46	89	93	1.85	1.85	4		57		
7	7	30	737.46	0.47	89	93	1.89	1.89	4		57		
8	8	35	741.30	0.47	89	93	1.89	1.89	4		57		
9	9	40	745.16	0.48	89	93	1.93	1.93	4		57		
10	10	45	748.94	0.44	89	93	1.77	1.77	4		57		
11	11	50	752.67	0.44	89	93	1.77	1.77	4		57		
12	12	55	756.35	0.43	90	94	1.73	1.73	3		57		
13	B-1	60	760.004	0.46	89	93	1.85	1.85	4		57		
14	2	65	764.05	0.45	89	94	1.81	1.81	4		58		
15	3	70	767.84	0.47	89	93	1.89	1.89	4		58		
16	4	75	771.66	0.47	89	93	1.89	1.89	4		58		
17	5	80	775.55	0.48	90	94	1.93	1.93	4		58		
18	6	85	779.37	0.48	90	94	1.93	1.93	4		57		
19	7	90	783.25	0.47	90	94	1.89	1.89	4		57		
20	8	95	787.08 (22)	0.47	90	94	1.89	1.89	4		58		
21	9	100	790.84	0.43	91	94	1.81	1.81	4		58		
22	10	105	794.59	0.43	91	94	1.73	1.73	3		58		
23	11	110	798.26	0.44	91	94	1.77	1.77	3		59		
24	12	115	801.99	0.42	91	94	1.69	1.69	3		59		√
25	END	120	805.608										
	FINAL												

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND. EXIT applies if sampling train has a condenser.

Min. (θ)	vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
120	90.693	0.455	89.5	93.3	1.831

%I = 100.3

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SAMPLING DATA - METHOD(S) 306

CLIENT _____

PLANT Century Plating Co, Inc. RUN NO. 1-306-03

CITY/STATE Chicago IL JOB NO. 98-015-311 DATE 1 Sept 98

SAMPLING LOC. Unit 1 TIME START 1240

BAROMETRIC PRESSURE, IN. HG 30.18 STATIC PRESSURE, IN. H2O -0.24 TIME FINISH 1445

LEAK √, VACUUM IN. HG 10 5" TEST PERSONNEL Ray/Eric

LEAK RATE, CFM 0.000 0.003 POSTTEST POS PRESS LEAK √ OK? •

• CONDUCT POSTTEST POSITIVE PRESSURE LEAK CHECK FOLLOWING THE LAST RUN PER LOCATION. FOR OTHER RUNS, ENTER "N/A".

EQUIPMENT CHECKS

- √ PITOT, PRETEST
- √ PITOT, POSTTEST
- √ NOZZLE, PRE/POST
- √ TC 81 °F PRE
- √ TC 91 °F POST
- OK ORSAT SYSTEM

FILTER/XAD	TARE WT.
N.ON.	200.6
	234
Silgel	200.0
	216.4

EQUIPMENT I.D. NUMBERS

REAGENT BOX n/a METER BOX 71.22 Y 0.9999

PITOT M-2-1 C_p 0.84 NOZ'L N-25D DIA. 0.250

TC READOUT _____ TC PROBE _____ UMBILICAL _____

SAMPL'G BOX _____ ORSAT PUMP _____ TEDLAR BAG _____

NOMOGRAPH DATA

DELTA-Ha	1.797		
METER TEMP.	90		
EST. %H2O	2		
"C" FACTOR	1.041		
STACK TEMP.	93		
REF DELTA-P	0.463		
"K" FACTOR	3.974		

LEAK CHECKS

B		B	
E		E	
B		B	
E		E	
B		B	
E		E	
B		B	
E		E	

Fyrites, %	
O_2	20.9
CO_2	0.1

Ycp 0.993

<=5% OF CAL'D Y? (Y) √ (N) ___

LINE	SAMPLE POINT	CLOCK TIME, MINUTES	DRY GAS METER READING, CUBIC FEET	PITOT READING, IN. H2O	GAS METER TEMP., °F	STACK TEMP., °F	ORIFICE SETTING, IN. H2O ACTUAL	ORIFICE SETTING, IN. H2O IDEAL	GAUGE VACUUM, IN. HG	GAS TEMPERATURES, °F FILTER *	GAS TEMPERATURES, °F IMPING. EXIT	GAS TEMPERATURES, °F PROBE OR COND EXIT**	√
1	A-1	0	805.961	0.43	90	94	1.83	1.83	4	n/a	54	n/a	√
2	2	5	809.69	0.45	89	94	1.81	1.81	4		53		
3	3	10	813.43	0.44	89	94	1.77	1.77	4		53		
4	4	15	817.14	0.46	90	94	1.86	1.86	4		53		
5	5	20	820.91	0.47	90	93	1.89	1.89	4		53		
6	6	25	824.76	0.48	90	93	1.94	1.94	4		53		
7	7	30	828.64	0.48	91	93	1.94	1.94	4		54		
8	8	35	832.52	0.45	91	94	1.81	1.81	4		54		
9	9	40	836.21	0.46	91	94	1.85	1.85	4		54		
10	10	45	840.01	0.43	92	94	1.74	1.74	4		54		
11	11	50	843.75	0.42	92	94	1.70	1.70	4		55		
12	12	55	847.44	0.39	92	95	1.57	1.57	4		55		
13	B-1	60	851.004	0.40	92	95	1.61	1.61	4		56		
14	2	65	854.66	0.43	92	95	1.73	1.73	4		56		
15	3	70	858.34	0.44	92	95	1.77	1.77	4		56		
16	4	75	862.15	0.44	92	95	1.77	1.77	4		56		
17	5	80	865.91	0.47	91	94	1.90	1.90	4		57		
18	6	85	869.79	0.47	91	94	1.89	1.89	4		57		
19	7	90	873.64	0.45	91	94	1.81	1.81	4		58		
20	9	95	877.49	0.46	92	94	1.86	1.86	4		58		
21	9	100	881.32	0.48	92	93	1.94	1.94	4		58		
22	10	105	885.24	0.48	91	93	1.94	1.94	4		59		
23	11	110	889.14	0.47	91	93	1.89	1.89	4		59		
24	12	115	893.01	0.45	91	94	1.81	1.81	4		60		
25	END	120	896.927										
	FINAL												

* FILTER EXIT for NJ Method 1. FILTER BOX for all others.

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND. EXIT applies if sampling train has a condenser.

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
120.	90.966	0.4497	91.1	93.9	1.814

Ts: 100.9

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MOISTURE ANALYTICAL RESULTS

Client Century Plating

Plant Name _____ Job No. 98-015-311

City/State Chicago, IL Sampling Loc. Dec. Plating tank

Run Number	1-306-01	1-306-02	1-306-03
Sampling Date	9/1/98	9/1/98	9/1/98
Analysis Date	"	"	"
Analyst	RWC	RWC	RWC
Reagent 1 (0.1N NaOH)			
Final Weight, g	229	232	234
Tared Weight, g	200	200	200
Water Catch, g	29	32	34
Reagent 2 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 (_____)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g	29	32	34
Silica Gel			
Final Weight, g	218.6	215.1	216.4
Tared Weight, g	200	200	200
ADSORBED WATER, g	18.6	15.1	16.4
TOTAL WATER COLLECTED, g	47.6	47.1	50.4

Balance No. RWC-016 Type (✓) Triple Beam ___ Electronic ✓ Reagent Box No. _____

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments _____

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